TEACHERS' RETIREMENT BOARD

INVESTMENT COMMITTEE

SUBJECT: Equitization of Cash | ITEM NUMBER: 8

ATTACHMENT(S): 2

ACTION: X | DATE OF MEETING: October 7, 1998

INFORMATION: ____ | PRESENTER(S): Mr. Tong

EXECUTIVE SUMMARY

In February 1998, Pension Consulting Alliance presented an agenda item to the Investment Committee defining a cash equitization program. The Investment Committee directed staff to complete further analysis to identify the viability of a cash equitization program and then report the findings and/or recommendations to the Investment Committee. One of the 1998/99 objectives approved for the Investment Branch was to present recommendations to the Investment Committee regarding a cash equitization program for the California State Teachers' Retirement System's domestic equity portfolio.

An analysis of implementation issues associated with a cash equitization program is included in Attachment 1. This analysis includes the amount of cash held by domestic equity managers, reasons for holding cash in a domestic equity portfolio, and elements to consider in evaluating a cash equitization program.

The primary reason to consider a cash equitization program would be to provide a mechanism to enable the domestic equity exposure to remain close to the adopted strategic asset allocation policy target. The cash equitization program will minimize performance aberrations attributable to equity manager cash without impacting the equity manager's investment discretion.

Recommendations

Staff recommends the following:

1. Direction to implement a cash equitization program for the domestic equity cash balances, subject to Investment Committee approval of policies.

2. Adoption of the S&P 500 Index as the performance benchmark for the cash equitization program.

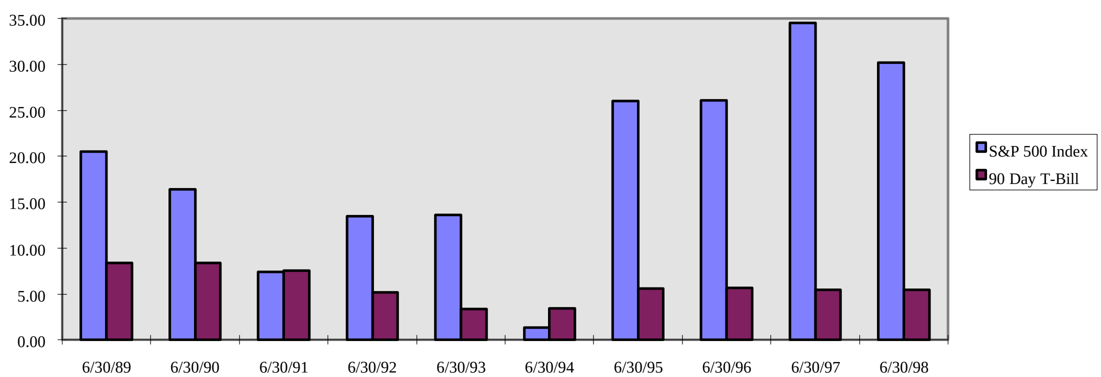
Cash Equitization Program

Background

Cash equitization programs have been available since the creation of the S&P 500 Index futures market in the 1980's. The recent performance differential between the S&P 500 Index and cash investments have caused renewed interest in these programs. By establishing a cash equitization program, cash would produce returns comparable to domestic equity while retaining a high level of liquidity. Equitization of cash would allow the equity managers to meet cash obligations while allowing STRS to maintain equity market exposure.

Historically, the returns on domestic equity have been higher than on cash and cash equivalents. In fact, over the past ten years, the annualized return on domestic equity has exceeded the return on cash by 12.70%. Table 1 shows the performance statistics for each of the past ten years.

Table 1: Total Rate of Return Analysis 1989 - 1998
S&P 500 Index Compared to 90 Day T-Bill



Cash held in the domestic equity manager's portfolio can be "equitized" by using S&P 500 Index futures. S&P 500 Index futures contracts are traded on the Chicago Mercantile Exchange (CME). These instruments are extremely liquid, have a low cost, and closely track the S&P 500 Index. Currently, the average daily trading volume of S&P 500 Index futures exceeds that of the New York Stock Exchange.

Equitizing cash involves investing in S&P 500 Index futures in combination with a cash strategy. The cash strategy is designed to provide a return above the financing rate (e.g. LIBOR) assumed in the fair value calculation for S&P 500 Index futures. This technique of equitizing cash is commonly referred to as "enhanced indexing" and has an expected return slightly above the S&P 500 Index.

In February 1998, Pension Consulting Alliance, Inc. (PCA) presented a report defining a cash equitization program for a domestic equity portfolio. In determining whether the use of a cash equitization program could be appropriate for a public pension fund, PCA highlighted the following items for the Investment Committee:

- The total domestic equity manager cash balances may have a material impact on the domestic equity portfolio's performance.
- The S&P 500 Index futures contracts, which are derivative instruments, can be used to equitize cash.
- Equitizing cash will reduce tracking error for the overall domestic equity portfolio compared to its performance benchmark.
- Equitizing cash has the potential for being highly volatile, depending on the difference between the S&P 500 Index return and the cash return.

A cash equitization program will allow the California State Teachers' Retirement System (STRS) to convert the returns associated with cash to S&P 500 Index returns. Over the next several pages, three situations are identified where equity returns may be more appropriate than cash returns. The philosophy behind converting cash returns to equity returns is identical for each situation. However, the implementation of a cash equitization program requires different strategies. For each situation an analysis was completed to estimate the relative economic impact to STRS.

Active Manager Cash

Active domestic equity managers have historically held a portion of the equity portfolio in cash. It is reasonable to expect active managers will continue to hold cash in the future. The aggregate cash balance will increase as STRS hires additional active domestic equity managers. Investment guidelines restrict the amount of cash reserves to a maximum of ten percent of the total portfolio. The amount invested in cash reduces exposure to the domestic equity market. If cash balances persist over an extended period of time, the risk/return matrix of the domestic equity portfolio will be different than expected during asset/liability modeling. The persistent use of cash creates tracking error when compared to the strategic performance benchmark. A cash equitization program will allow STRS to gain domestic equity exposure to minimize expected tracking error without impacting the active manager's investment discretion.

As of August 31, 1998, the total market value of the active component of the domestic equity portfolio was approximately $3.0 billion. Of this amount, $180 million or approximately 6% was held as cash balances. Active domestic equity managers have averaged between three to eight percent cash balances during the past decade. Over the past five years, the aggregate cash balance for STRS' domestic equity managers has ranged from $100 to $400 million.

The aggregate cash balance for the domestic equity portfolio will increase as additional active equity managers are hired, and subsequently, hold cash reserves. The total cash balance included in the active domestic equity portfolio is estimated to average between $300 million and $400 million over time.

The following example illustrates the results of holding excess cash in the active component of the domestic equity portfolio. During the volatile twelve month period ended August 31, 1998, the S&P 500 Index had an annualized return of 8.11% compared to 5.43% for U.S. T-Bills. During this period, the cash reserves in the active domestic equity component ranged from $80 million to $160 million. Table 2 shows a monthly analysis of the total rate of return and the opportunity gain/(cost) associated with a cash equitization program. A cash equitization program would have added approximately $2.8 million in total income over the last twelve months.

Table 2: Cash and S&P 500 Total Returns

Month	Cash Balances (in millions)	S&P 500 Index Return (in percent)	Cash Return (in percent)	Opportunity Gain/(Cost)[1] (in millions)
9/97	$130	5.46%	0.47%	$6.5
10/97	141	(3.34)	0.43	(5.3)
11/97	111	4.63	0.42	4.7
12/97	119	1.72	0.43	1.5
1/98	160	1.11	0.48	1.0
2/98	119	7.21	0.39	8.1
3/98	136	5.12	0.47	6.3
4/98	100	1.01	0.45	0.6
5/98	80	(1.72)	0.45	(1.7)
6/98	117	4.06	0.44	4.2
7/98	128	(1.06)	0.42	(1.9)
8/98	142	(14.44)	0.46	(21.2)
Cumulative		8.11%	5.43%	$2.8

[1] Opportunity gain/(cost) equals the difference between the S&P 500 Index return and the cash return multiplied by the domestic equity cash holdings.

The impact of a cash equitization program on the total domestic equity portfolio's performance can be measured by the difference between cash return and the S&P 500 Index return. In the above example, the investment portfolio return is reduced by holding cash when equity returns exceeds cash returns. When cash returns exceed equity returns, holding cash proves to be the better strategy. Over the twelve month period ending August 31 ,1998, equity returns exceeded the cash returns in eight of the twelve months.

Passive Manager Cash

The S&P 500 index manager constructs a portfolio which is designed to replicate (track) the performance of the S&P 500 benchmark. The index manager holds a small percentage of cash for trading activity resulting from index additions and deletions, dividend payments, and adjustments to outstanding equity.

The application of a cash equitization program could reduce tracking error caused by cash balances and dividends receivable (timing difference between ex-date and pay-date). The following example illustrates the results of holding cash in a S&P Index portfolio. Over a recent twelve month period, the S&P 500 Index had an annualized return of 8.11% compared to 5.43% for U.S. T-Bills. The opportunity cost of holding cash over this period could have been approximately $2.3 million. Table 3 shows a monthly analysis.

Table 3: Synthetic Index and S&P 500 Total Returns

Month	Domestic Equity Cash (in millions)	S&P 500 Index Return (in percent)	Cash Return (in percent)	Opportunity Gain/(Cost)[1] (in millions)
9/97	$14	5.46%	0.47%	$0.7
10/97	13	(3.34)	0.43	(0.5)
11/97	12	4.63	0.42	0.5
12/97	16	1.72	0.43	0.2
1/98	4	1.11	0.48	0.0
2/98	18	7.21	0.39	1.2
3/98	18	5.12	0.47	0.8
4/98	30	1.01	0.45	0.2
5/98	3	(1.72)	0.45	0.0
6/98	14	4.06	0.44	0.5
7/98	15	(1.06)	0.42	(0.2)
8/98	7	(14.44)	0.46	(1.1)
Cumulative		8.11%	5.43%	$2.3

[1] Opportunity cost equals the difference between the S&P 500 Index return and the cash return multiplied by the domestic equity cash holdings.

Manager Transition Cash

Occasionally, a domestic equity portfolio is liquidated with the proceeds re-deployed to another domestic equity account. This is commonly referred to as a "manager transition". If the liquidation and re-deployment are made simultaneously, the allocation to domestic equity will remain unchanged. However, if there is a time lag, there may be an opportunity cost associated with holding the cash proceeds generated from the security sales. This cost reflects the difference in return between cash and equity. A cash equitization program minimizes the change in asset allocation associated with a manager transition. If the cash proceeds are equitized, then asset allocation will be preserved until another manager is funded.

The following example assumes the proceeds from the sale of the securities were held in cash until completion of the liquidation. The S&P Index change is the amount of cumulative change from the sales date to the completion date. If a cash equitization program had been utilized to maintain equity market exposure, the portfolio would have gained approximately $7.7 million. The opportunity gain/cost is time period dependent.

Table 4: Equitized Cash Generated from Sale of Securities

Date	Sales Proceeds	S&P Index Change	% S&P Index Change	Opportunity Gain/(Cost)[1]
Day 1	$21,005,964	50.62	8.3%	$1,748,194
Day 4	29,691,512	47.03	7.7	2,282,319
Day 6	6,080,266	46.07	7.5	457,166
Day 7	4,680,266	38.90	6.3	293,667
Day 8	3,550,677	41.83	6.8	240,709
Day 12	10,249,475	37.24	6.0	614,025
Day 13	39,029,176	28.71	4.6	1,778,191
Day 14	10,545,180	22.84	3.6	378,686
Day 15	17,040,272	(2.59)	(0.4)	(66,723)
Day 18	11,431,870	(1.65)	(0.2)	(28,557)
Total				$7,697,677

[1] Opportunity gain/cost equals the difference between the S&P 500 Index return and the cash return multiplied by the sales proceeds.

Equitized Cash Implementation Issues

Internal Versus External Management

Morgan Stanley research indicates that pension plans that manage equity funds internally typically will manage the cash equitization themselves, while plans that do not manage equity portfolios internally will contract with external manager(s) to manage the program. There are a variety of vendors which have created products that provide exposure to the U.S. equity market with the liquidity of a short-term cash fund. These overlay products are available at a variety of fees depending on the size of the assignment and complexity of the product.

The advantages of managing a program internally are centered on the issues of control, cost, and flexibility. By managing the cash equitization internally, STRS has the ability to control trading activity in the program. Also, an internally managed cash equitization program would not require significant incremental costs. The cash equitization program can be conducted utilizing the expertise of STRS' current equity, fixed income, and liquidity managers. An internally managed program allows for flexibility to balance trading costs, market activity, and cash balances. One disadvantage in managing the cash equitization program internally would be a shift in fiduciary responsibility from an external vendor to STRS' employees.

Portfolio Construction

The management of a synthetic indexed portfolio is straightforward. S&P 500 Index futures are used to equitize cash (convert a cash return to equity return). The actual cash balance is invested in a short-term portfolio which, when combined with the futures positions, is expected to provide a total return equal to or greater than the S&P 500 Index. Appendix A demonstrates the steps of creating equity exposure through stock index futures. Appendix B identifies the strategy that will be used in concert for the management of cash.

Liquidity

Open interest in the S&P 500 Index futures is currently around $100 billion. Implementing a synthetic indexing program of $200 million to $300 million would not affect the S&P 500 Index futures market. A typical day's trading volume in S&P 500 Index futures is approximately $30 billion.

Performance Issues

A cash equitization program provides an opportunity to improve performance relative to the strategic benchmark. Table 5 illustrates the total return and impact on the domestic equity portfolio during up and down market environments.

Table 5: Total Return of Domestic Equity Portfolio (12 Months)

	Scenarios				
Market Returns (in percent)	1	2	3	4	5
Equity	15.00%	10.00%	8.00%	0.00%	(5.00)%
Cash	4.50	4.50	5.50	6.00	6.00

If a cash equitization program could be implemented using the above assumptions there would be a matrix of potential gains and losses associated with the trading of cash returns for equity returns. If equity returns exceed cash, there would be a positive impact and if cash returns are higher there would be a negative impact. The matrix below the impact for seven level of cash in the $6.4 billion actively managed domestic equity portfolio.

2% Cash	$13.6	$ 7.1	$ 3.2	$(7.8)	$(14.2)
3% Cash	20.3	10.7	4.8	(11.6)	(21.3)
4% Cash	27.1	14.2	6.5	(15.5)	(28.4)
5% Cash	33.9	17.8	8.0	(19.4)	(35.5)
6% Cash	40.7	21.3	9.7	(23.3)	(42.6)
7% Cash	47.5	24.9	11.3	(27.1)	(49.7)
8% Cash	54.3	28.4	12.9	(31.0)	(56.8)

[1] Opportunity cost equals the difference between the equity return and the cash return multiplied by the cash holdings.

There are three important considerations illustrated above: (1) with or without a cash equitization program there are monetary ramifications, (2) the higher the percent of cash the greater the monetary impact, and (3) the monetary impact can be in the millions of dollars annually.

Risks and Concerns

The S&P 500 Index futures contract trade at the Chicago Mercantile Exchange (CME) with expirations on the third Friday in the months of March, June, September, and December. The futures contract with the nearest expiration date is referred to as the “front” contract. While the contract with the following expiration date is the “next” contract. Each quarter an investor sells the front contract and simultaneously buys the next contract. At times, the S&P 500 Index futures contracts could trade above (“rich”) or below (“cheap”) their fair value. Occasionally, technical considerations cause temporary aberrations that results in either a positive or negative impact on performance. Over longer periods of time the liquidity and trading volume in the S&P 500 Index futures market ensure fair market pricing.

A synthetic index is a combination of futures contracts and short-term fixed income instruments. The performance of a synthetic index fund is generally similar to the S&P 500 Index. Futures pricing (cheap or rich), commissions, and market impact may contribute to a minimal tracking error. The ability to invest cash either at a higher or lower rate than the implied rate (cost of borrowing) will affect performance.

Conclusion and Recommendations

A cash equitization program will enable the domestic equity exposure to remain close to the adopted strategic asset allocation policy targets. Additionally, the process will minimize performance aberrations attributable to equity manager cash without impacting the equity manager’s investment discretion. The use of S&P 500 Index futures contracts will stabilize exposure to the domestic equity market in an inexpensive and efficient manner.

After review and analysis, staff recommends the following:

1. Direction to implement a cash equitization program for the domestic equity cash balances, subject to Investment Committee approval of policies.

2. Adoption of the S&P 500 Index as the performance benchmark for the cash equitization program.

PENSION CONSULTING ALLIANCE, INC.

Los Angeles, California
Walnut Creek, California
Portland, Oregon
Detroit, Michigan
Panama City, Florida

DATE: September 14, 1998

TO: CalSTRS Board

FROM: Pension Consulting Alliance, Inc.

SUBJECT: STRS' Use of Equitized Cash

Background

In February, 1998, STRS Staff and PCA presented a brief study on equitized cash. This study i) defined and described equitized cash, ii) discussed equitized cash's uses, and iii) reviewed specific issues related to executing an equitized cash program. Since that presentation, STRS Staff has explored the specific areas where equitized cash would prove most useful. The accompanying Staff report summarizes their findings and recommendations on how STRS might best execute an equitized cash program.

In summary, PCA believes a cash equitization program at STRS would prove useful. The fundamental notion behind such a program is that it would help to reduce overall asset class tracking error within the domestic equities portfolio.

Discussion

As described in the February report, the role of equitized cash is to give equity-like returns to frictional or excess cash balances that might develop within the domestic equity portfolio for a variety of reasons. This role can prove material since the strategic benchmark assumes instant reinvestment of any cash proceeds coming from dividend payments. As a result, the benchmark does not contain cash.

Reasons why cash balances would exist within the domestic equity portfolio include: i) manager transitions may cause cash to accumulate, ii) active managers that remain less than fully invested may hold material levels of cash

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over time, iii) managers may hold cash as they shift holdings within their equity portfolios, or iv) asset class rebalancings that may cause STRS to raise and hold cash for some specified period of time.

To minimize the performance tracking error associated with holding these types of cash balances within the domestic equity portfolio, many institutions (including a few other PCA clients) use equitized cash programs. Executing equitized cash programs typically take two forms: i) those executed by a third-party vendor and ii) those executed internally. The third-party programs are often managed by investment advisor affiliates of custodian banks (such as State Street). In these cases, cash balances are "swept" into an equitized cash account on a daily basis. This account then generates domestic equity index returns using S&P 100 or S&P 500 futures. Because these instruments are very liquid, the equitized cash account can also handle daily withdrawals, if required. Typically, plan sponsors use these accounts to equitize a material portion of their active managers' cash balances.

Large plan sponsors also use the futures instruments to gain exposure to the equity markets in more unique situations, such as asset class rebalancing and manager transitions. In these cases, the more generic third party equitized cash program may prove somewhat cumbersome to implement. Here, an internal program may be able to meet the customized requirements of the plan sponsor with the appropriate timing.

Conclusion

PCA has reviewed Attachment 1 and agrees, in concept, with the recommendation to use an equitized cash program to improve the tracking performance of the overall domestic equity program. Upon approval of Staff's recommendation, the next step would be for Staff and PCA to develop, and present policies to implement a cash equitization program.